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Blue Crab Movement in Coastal South Carolina, 1958–59

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ABSTRACT

In 1958 and 1959, 4,353 blue crabs of 5 inches or greater carapace width were tagged in three estuaries and at two coastal locations in South Carolina to determine coastal movement. Locations of 530 returns indicate that most of the crabs did not migrate between estuaries, but limited their movement between the lower estuary and adjacent coastal waters. It was concluded, at least for South Carolina, that management measures can probably be confined to individual estuarine systems rather than large coastal regions.

INTRODUCTION

The blue crab, *Callinectes sapidus*, fishery of the Atlantic and Gulf coasts of the United States is limited to areas where crabs are concentrated, and, therefore, knowledge of their movement is important for management. The purpose of this investigation was to determine movement of blue crabs in coastal South Carolina, and to consider possible management implications. This was a cooperative study by the Bears Bluff Laboratories, Wadmalaw Island, South Carolina, and the U. S. Bureau of Commercial Fisheries, Beaufort, North Carolina.

Studies in Chesapeake Bay indicated that crab migrations are related to phases of the life cycle (Churchill, 1919; Fiedler, 1930; Truitt, 1939). Spawning begins in the spring and continues throughout the summer in high salinity waters adjacent to the inlets and ocean. After hatching, larval or young crabs move to less saline waters of sounds and rivers where they mature in about one year. Female crabs mate after their last molt, and then move to more saline waters to spawn. Males tend to remain in brackish waters. Studies in Delaware Bay (Porter, 1956), in Texas (Daugherty, 1952), and in Louisiana (Darnell, 1959) at various times during the year indicated movement of adult crabs in these areas similar to that in Chesapeake Bay. Although the life history of the blue crab in South Carolina has not been studied it is "... probably quite similar in all sections of the coast" (Pearson, 1951).

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METHODS

In 1958 and 1959, 4,353 crabs of commercial size (5 inches or greater in carapace width) were tagged and released in South Carolina waters. Crabs were captured by otter trawl, tagged, and released in the vicinity of capture. All females were mature, but maturity of males could not be determined by observation.

A carapace tag (Rounsefell and Everhart, 1953) was attached to each crab with stainless steel wire. One side of the tag was numbered, and the other bore the name and address of the tagging institution and a reward notice. Reward for each tag returned was 25 cents, and recoveries were dependent on voluntary returns. Publicity was given the project through newspapers and reward posters displayed by crab dealers and processors.

Tagging was done in three estuaries and two coastal areas. The estuaries were the North Edisto River at Point of Pines, the Ashley–Cooper River at Mt. Pleasant, and Bull Bay off Five Fathom Creek. Coastal tagging was done near the North Edisto River sea buoy 4 miles from the mouth of the estuary, and off Morris Island ¾ mile from the mouth of the Ashley–Cooper River (Figure 1).

In 1958, 1959, and 1960, 530 tags were returned, mostly by commercial fishermen. Eighteen lacked sufficient recovery information and were not used in the analysis. Tagged crabs were caught by pot, trotline, and otter trawl. These gears were fished most of the year in sounds and bays, but trawls were also operated in coastal waters at the mouths of rivers and along ocean beaches. It was assumed that tagged crabs were similar in behavior to untagged crabs. Although

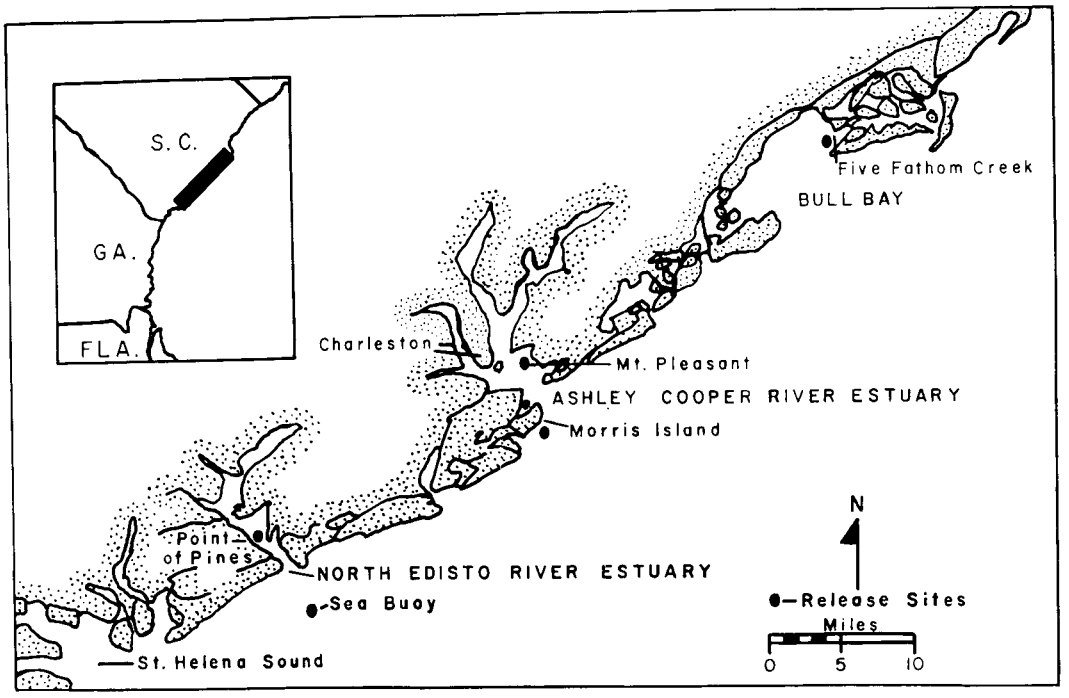

FIGURE 1.—Blue crab tagging locations, South Carolina, 1958–59

fishing effort was not uniform throughout the coastal area, this was not believed to have materially affected conclusions regarding crab movement.

RESULTS

Of the 2,918 crabs (1,612 males, 1,306 females) tagged within estuaries, 409 (229 males, 180 females) were recovered (Table 1). Sixty-five percent of the male and 40 percent of the female recaptures were within the area of release. Area of release was defined as within the estuary, but not more than 5 miles from the tagging location. Three percent of the male recaptures were made outside the release area in the estuaries upriver from the tagging location.

Twenty-nine percent of the male and 57 percent of the female recaptures were in coastal waters outside the estuaries. Most recoveries (79 percent) were made less than 5

TABLE 1.—*Recovery of tagged blue crabs released in estuarine waters of South Carolina*

Location and date	Number released		Number recovered									
			Release estuary				Outside release estuary					
	Sex		Release area		Outside release area		Coastal waters		Other estuaries		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
North Edisto River:												
Point of Pines												
January 1958	878	610	82	18	3	–	58	91	–	5	143	114
January 1959	208	12	23	–	1	–	4	–	6	–	34	–
March 1959	11	11	2	–	–	–	1	–	–	–	3	–
August 1959	13	1	1	–	–	–	–	1	–	–	1	1
Ashley-Cooper River:												
Mt. Pleasant												
March 1959	223	257	4	1	2	–	–	6	–	1	6	8
Bull Bay:												
Five Fathom Creek												
March 1959	279	415	37	53	1	–	3	4	1	–	42	57
Totals	1,612	1,306	149	72	7	–	66	102	7	6	229	180
Percentages	–	–	65	40	3	–	29	57	3	3	100	100

TABLE 2.—*Month and area of recovery for 251 tagged blue crabs released near Point of Pines in the North Edisto River in January 1958 and recovered from January–August 1958*[1]

Month	Recovery area					
	Vicinity Point of Pines		Vicinity sea buoy		Other coastal areas	
	M	F	M	F	M	F
January	–	–	–	–	–	–
February	–	–	–	–	–	–
March	1	–	22	25	1	–
April	23	2	29	24	–	3
May	35	2	5	10	–	7
June	21	11	–	7	1	11
July	2	1	–	2	–	4
August	–	–	–	–	–	2
Totals	82	16	56	68	2	27
Percentages	59	15	40	61	1	24

[1] Not included in the table were three recoveries made away from estuary after August 1958 and three made upriver from Point of Pines.

miles from the mouths of the estuaries where tagged. Four males and 31 females were recovered in coastal waters more than 5 miles from the estuaries. Seven males and six females (3 percent of the recoveries) were recaptured in other estuaries. These studies indicate that a greater percentage of females moved from the estuaries to coastal waters than did males, and that most crabs leaving the estuaries remained in adjacent coastal areas.

Tagging in the North Edisto River at Point of Pines in January 1958 indicated that some crabs moved from the estuary to coastal waters in late winter, and that a greater percentage of females remained in coastal waters in the spring and summer than did males (Table 2). A smaller proportion of crabs moved to the area of the North Edisto River sea buoy from Point of Pines in late winter of 1959 compared to that of 1958 (Table 1). From January to March 1958, and to a lesser extent in 1959, water temperature and salinity near Point of Pines were generally lower than near the sea buoy.[3] Crab movement in late winter from Point of Pines to the warmer and more saline waters in the vicinity of the sea buoy, particularly in 1958, may have been related to these environmental factors.

Of the 1,435 blue crabs (500 males, 935 females) tagged in coastal waters, 103 (44 males, 59 females) were recovered (Table 3). Thirty-nine percent of the male and 47 percent of the female recaptures were in the area of release. Area of release was defined as coastal waters within 5 miles of the tagging location.

Fifty-two percent of the male and 34 percent of the female recoveries were made in estuaries. Almost all recoveries were in the estuary adjacent to the coastal tagging site. Only four males and four females were recovered in other estuaries. Nine percent of the male and 19 percent of the female recoveries were made in coastal areas more than 5 miles from location of tagging. In general, crabs tagged in coastal areas remained in the area of tagging or moved into the adjacent estuary. More males than females moved from coastal waters into estuaries, and more females than males were recovered from coastal waters at distances greater than 5 miles from location of tagging.

From all experiments, 71 crabs (19 males, 52 females) or 14 percent of those recovered were recaptured away from both estuarine and coastal tagging locations. Thirty-three recoveries were made north and 38 recov-

[3] Unpublished data, Bears Bluff Laboratories, Wadmalaw Island, South Carolina.

TABLE 3.—*Recovery of tagged blue crabs released in coastal waters of South Carolina*

Location and date	Number released		Number recovered							
	Sex		Release area		Outside release area				Total	
					Estuarine waters		Coastal waters			
	M	F	M	F	M	F	M	F	M	F
North Edisto River:										
Sea buoy										
January 1958	5	55	–	6	–	2	–	1	–	9
March 1959	70	106	4	9	7	2	2	1	13	12
August 1959	202	398	2	1	12	9	2	2	16	12
Ashley-Cooper River:										
Morris Island										
March 1959	58	182	4	5	2	2	–	4	6	11
August 1959	165	194	7	7	2	5	–	3	9	15
Totals	500	935	17	28	23	20	4	11	44	59
Percentages	–	–	39	47	52	34	9	19	100	100

eries were made south of the release areas. Distances of outside recoveries from release areas were: 33 crabs, 5 to 15 miles; 29 crabs, 15 to 30 miles; 7 crabs, 30 to 50 miles; 1 crab, 90 miles; and 1 crab, 145 miles. The last recovery, a female tagged in January 1958 in the North Edisto River, was recaptured in May 1958 near the mouth of the St. Johns River, Florida. The most distant recovery of a male was 30 miles from location of tagging.

CONCLUSIONS

These studies indicate movement of adult crabs between the lower estuary and adjacent coastal waters. Only 3 percent of the tagged crabs recaptured were recovered in estuaries other than those in which tagged. Random coastal movement was demonstrated by a small percentage of crabs. In general, commercial-sized crabs did not migrate between estuaries, but limited their movements to the estuary or adjacent coastal area in which they were tagged. This indicates, at least for South Carolina waters, that management measures can probably be confined to individual estuarine systems rather than large coastal regions.

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